

CLAIMS

What is claimed is:

1. A method for identifying at least a section of a first schematic associated with at least a section of a second schematic wherein each of the first and second schematics includes a set of components for configuring a system to perform a process and wherein the components of the first and second schematics are first and second different types, respectively, the method comprising the steps of:
 - a) identifying the components of the first type included in the first section of the first schematic;
 - b) examining the second schematic to identify at least one instance of components of the second type that are associated with the identified components of the first type; and
 - c) when at least one instance of components of the second type is identified, rendering the at least one instance accessible.
2. The method of claim 1 wherein the first and second schematics include schematic icons of first and second types, respectively, and wherein the step of identifying the components of the first type includes identifying the icons in the first section of the first schematic.
3. The method of claim 2 further including the step of providing a specification that associates icons of the first type with icons of the second type and wherein the step of examining the second schematic includes using the specification to identify icons of the second type that are associated with the identified icons of the first type and searching the second schematic for the identified icons of the second type.
4. The method of claim 3 wherein the first schematic is a mechanical schematic including icons corresponding to mechanical components in an automated facility and the second schematic is an electrical schematic associated with the mechanical schematic and including icons corresponding to electrical components used to control mechanical components in an automated facility.

5. The method of claim 4 wherein the step of providing a specification includes providing a set of templates, each template including a mechanical template icon subset corresponding to mechanical components and an electrical template icon sub-set corresponding to electrical components for controlling the components

5 associated with the icons in the mechanical template set, the step of identifying icons in the first schematic including identifying at least one mechanical template sub-set in the mechanical schematic.

6. The method of claim 5 wherein at least a sub-set of the templates include child template specifications, each child template specification indicating possible inclusion of at least one other template.

7. The method of claim 5 wherein at least a sub-set of the templates also specify at least one relationship between the mechanical template sub-set icons and wherein the step of identifying the at least one mechanical template sub-set within the mechanical schematic further includes identifying the at least one relationship

5 between mechanical schematic icons.

8. The method of claim 7 wherein the at least one relationship specifies a spatial juxtaposition of the mechanical template sub-set icons and the step of identifying the at least one relationship includes determining the spatial juxtaposition of the mechanical schematic icons.

9. The method of claim 7 wherein the at least one relationship specifies at least one schematic linkage between mechanical template sub-set icons and wherein the step of identifying the at least one relationship includes identifying the at least one schematic linkage between the mechanical schematic icons.

10. The method of claim 5 wherein the step of using the specification includes accessing the electrical template sub-set in the identified template.

11. The method of claim 10 wherein the step of examining includes scanning the second record for at least one instance of the accessed electrical template sub-set.

12. The method of claim 11 wherein the identified template also specifies at least one relationship between electrical template sub-set icons and wherein the step of scanning includes scanning the electrical schematic for at least one instance of the accessed electrical template sub-set where the electrical template sub-set icons are characterized by the at least one relationship.

13. The method of claim 12 wherein the relationship is based on the spatial juxtaposition of the electrical template sub-set icons.

14. The method of claim 12 wherein the relationship is based on at least one schematic linkage between the electrical template sub-set icons.

15. The method of claim 12 wherein the electrical schematics comprise a plurality of schematic pages and wherein the relationship is a function of the pages on which the electrical template sub-set icons appear.

16. The method of claim 1 for use with a visual interface wherein the step of identifying the components of the first type included in the first section of the first schematic includes displaying at least a portion of the first schematic section via the interface and receiving a selection command via the interface.

17. The method of claim 16 wherein the step of rendering accessible includes displaying at least a portion of the second schematic section via the interface.

18. The method of claim 17 wherein the second schematic section is part of a larger segment of the second schematic and wherein the step of displaying the second section includes displaying the second section in a distinguishing fashion within the larger segment.

19. The method of claim 11 wherein the first schematic includes a plurality of icon sub-sets corresponding to mechanical template sub-sets specified by the templates and wherein the process is performed for each of the plurality of icon sub-sets in the mechanical schematic.

20. The method of claim 19 wherein the step of rendering accessible includes storing correlating information in a database for subsequent use that correlates mechanical template sub-sets in the first schematic with specific instances of electrical template sub-sets in the second schematic.

21. The method of claim 19 wherein, for at least one of the mechanical template sub-sets in the mechanical schematic there is no corresponding electrical template sub-set in the electrical schematic and, wherein the method further includes the steps of, for the at least one mechanical template sub-set in the mechanical schematic for which there is no corresponding electrical template sub-set in the electrical schematic, performing a secondary function.

22. The method of claim 21 wherein the secondary function includes indicating that there is no electrical template sub-set in the electrical schematic for the at least one mechanical template sub-set.

23. The method of claim 22 for use with a visual interface wherein the step of indicating includes displaying the at least one mechanical template sub-set in the mechanical schematic for which there is no corresponding electrical template sub-set in the electrical schematic in a distinguishing manner.

24. The method of claim 21 wherein the secondary function includes using the electrical template sub-set associated with the at least one mechanical template sub-set to identify a suitable electrical icon sub-set for the at least one mechanical template sub-set.

25. The method of claim 24 wherein the secondary function further includes providing the suitable electronic icon sub-set to a system user as a suggestion to be added to the electronic schematic.
26. The method of claim 24 wherein the secondary function further includes using the suitable electronic icon sub-set to augment the electrical schematic.
27. The method of claim 26 further including the step of, after augmenting the electrical schematic, indicating the augmented portion of the electrical schematic in a distinguishable manner.
28. The method of claim 26 further including the step of, after augmenting the electrical schematic, indicating the at least one mechanical template sub-set icons in the mechanical schematic in a distinguishing manner.
29. The method of claim 19 wherein, for at least some mechanical icons in the mechanical schematic there are no templates and, wherein, the method further includes the step of identifying mechanical icons in the mechanical schematic for which there are no templates.
30. The method of claim 29 further including the step of indicating in a distinguishing manner the mechanical icons for which there are no templates.
31. The method of claim 30 further including the steps of providing tools to enable a system user to define electrical icons corresponding to the mechanical icons for which there are no templates and to add the defined electronic icons to the electrical schematics.
32. The method of claim 31 further including the steps of enabling the system user to store the defined electronic icons and the associated mechanical icons as a new template for subsequent use.

33. The method of claim 1 wherein, for at least a sub-set of the identified components of the first type included in the first section of the first schematic there are at least two instances of the components of the second type that are associated with the identified components of the first type and wherein the step of rendering

5 accessible includes indicating each of the at least two instances of the components of the second type.

34. The method of claim 33 further including the step of providing a selection tool to enable a system user to designate one of the at least two instances of the components of the second type.

35. A method for generating electrical schematics including electrical icons indicating electrical components useable to control mechanical components that are indicated by mechanical icons on pre-existing mechanical schematics, the method comprising the steps of:

- 5 using a processor to perform the steps of:
 - a) identifying at least one sub-set of mechanical components on the mechanical schematic;
 - b) identifying electrical components suitable for controlling the identified at least one sub-set of mechanical components; and
- 10 c) using the identified electrical components to generate an electrical schematic for controlling the identified at least sub-set of mechanical components on the mechanical schematic.

36. The method of claim 35 wherein the step of identifying electrical components includes the steps of providing a specification that indicates electrical components for controlling mechanical components, accessing the specification and using the specification to identify electrical components for controlling the at least

- 5 one sub-set of the mechanical components.

37. The method of claim 36 wherein the step of providing a specification includes providing a set of templates, each template including a mechanical template icon subset corresponding to mechanical components and an electrical template icon sub-set corresponding to electrical components for controlling the components

- 5 in the mechanical template set, the step of identify electrical components including the steps of identifying at least one mechanical template sub-set in the mechanical schematic, identifying the electrical template sub-set associated with the identified at least one mechanical template sub-set and using the identified electrical template sub-set to generate at least part of the electrical schematic.

38. The method of claim 37 further including the step of storing correlating information in a database for subsequent use that correlates mechanical template sub-sets in the mechanical schematic with specific instances of electrical template sub-sets in the electrical schematic.

39. The method of claim 37 wherein, for at least some mechanical icons in the mechanical schematic there are no templates and, wherein, the method further includes the step of identifying mechanical icons in the mechanical schematic for which there are no templates.

40. The method of claim 39 further including the step of indicating in a distinguishing manner the mechanical icons for which there are no templates.

41. The method of claim 40 further including the steps of providing tools to enable a system user to define electrical icons corresponding to the mechanical icons for which there are no templates and to add the defined electronic icons to the electrical schematic.

42. The method of claim 41 further including the steps of enabling the system user to store the defined electronic icons and the associated mechanical icons as a new template for subsequent use.

43. The method of claim 37 wherein the step of identifying at least one mechanical template sub-set in the mechanical schematic includes accessing at least one mechanical template sub-set in the specification, identifying the accessed mechanical template icon sub-set and searching the mechanical schematic for the

5 identified icon sub-set in the accessed mechanical template.

44. The method of claim 43 wherein the method steps are repeated using a different one of the mechanical templates during each cycle through the method until one of:

(a) an electrical icon for controlling each mechanical schematic icon is

5 identified; and

(b) each of the mechanical template sub-sets is accessed and sought within the mechanical schematic.

45. A method for use with pre-existing electronically stored electrical and mechanical schematics where the electrical schematics indicate a control system to be used to control mechanical components corresponding to the mechanical schematics, the method for identifying mechanical components on the mechanical 5 schematics that are not supported by the control system defined by the electrical schematics, the method comprising the steps of:

using a processor to perform the steps of:

- a) identifying at least a sub-set of mechanical components in the mechanical schematics that are not supported by the electrical components in the 10 electrical schematics; and
- b) indicating the identified sub-set of mechanical components.

46. The method of claim 45 further including the step of providing a specification that associates mechanical components with electrical components for controlling the mechanical components and wherein the step of identifying at least a sub-set of mechanical components includes the step of using the specification to 5 identify mechanical components in the mechanical schematic that are unsupported by the electrical components in the electrical schematic.

47. The method of claim 46 wherein the step of using the specification includes using the specification to determine which mechanical components are supported by the electrical components and identifying other mechanical components as unsupported mechanical components.

48. The method of claim 46 further including the step of providing a visual interface and wherein the step of indicating includes displaying the mechanical schematics via the interface with the unsupported mechanical components displayed in a distinguishing manner.

49. The method of claim 47 wherein the electrical components that support the supported mechanical components are associated electrical components and wherein the method further includes the steps of identifying electrical components other than the associated electrical components on the electrical schematics and,

5 when the electrical schematics are viewed, indicating the other electrical components in a distinguishing manner.

50. The method of claim 47 wherein, for at least one unsupported mechanical component the method further includes the step of performing a secondary function.

51. The method of claim 50 wherein the secondary function includes using the specification to identify a sub-set of electrical components suitable for controlling the at least one unsupported mechanical component.

52. The method of claim 51 wherein the secondary function further includes providing the suitable electronic icon sub-set to a system user as a suggestion to be added to the electronic schematic.

53. The method of claim 51 wherein the secondary function further includes using the suitable electronic icon sub-set to augment the electrical schematic.

54. The method of claim 53 further including the step of, after augmenting the electrical schematic, indicating the augmented portion of the electrical schematic in a distinguishable manner.

55. A method for use with pre-existing electronically stored electrical and mechanical schematics where the electrical schematic indicates a control system to be used to control mechanical components corresponding to the mechanical schematic, the method comprising the steps of:

- 5 a) monitoring for changes to the mechanical schematic;
- b) for each change to the mechanical schematic, storing an indication of the change in a database; and
- c) after a change to the mechanical schematic is stored in the database and during an electrical schematic modifying process, when the mechanical
- 10 schematic is accessed, indicating the changes to the mechanical schematic in a distinguishing manner.

56. The method of claim 55 wherein the changes to the mechanical schematic include adding mechanical components and deleting mechanical components and wherein the step of indicating changes in a distinguishing manner includes indicating deleted and added mechanical components in different

- 5 distinguishing manners.

57. The method of claim 55 wherein at least some changes to the mechanical schematic include deleting mechanical components, the method further including the steps of, during an electronic schematic modifying process, selecting at least one of the mechanical schematic deletions indicated in a distinguishing manner

- 5 and rendering the electrical schematic components associated with the selected mechanical schematic deletion accessible.

58. The method of claim 57 also for use with a visual interface wherein the step of rendering includes displaying the electrical schematic components via the interface.

59. The method of claim 57 wherein the step of rendering includes the step of providing a specification that associates mechanical components with electrical components, accessing the specification after a component is deleted from the mechanical schematic, using the specification to identify an electrical component

5 associated with the deleted mechanical component, examining the electrical schematic for the identified electrical component and, when an electrical component is located via the examining step, rendering the electrical component accessible.

60. The method of claim 55 wherein at least some changes to the mechanical schematic includes adding mechanical components, the method further including the steps of, during an electronic schematic modifying process, selecting at least one of the mechanical schematic additions indicated in a distinguishing manner

5 and suggesting at least one electrical schematic component for controlling the selected addition.

61. The method of claim 60 also for use with a visual interface wherein the step of suggesting includes displaying the at least one suggested electrical schematic component via the interface.

62. The method of claim 60 wherein the step of suggesting includes the step of providing a specification that associates mechanical components with electrical components suitable for controlling the associated mechanical components, accessing the specification after a component is added to the

5 mechanical schematic, using the specification to identify an electrical component associated with the added mechanical component and rendering the identified electrical component accessible.

63. A method for use with pre-existing electronically stored electrical and mechanical schematics where the electrical schematic indicates a control system to be used to control mechanical components corresponding to the mechanical schematics, the method comprising the steps of:

- 5 a) monitoring for changes to the mechanical schematic; and
 b) for each change to the mechanical schematic, providing suggested changes to the electrical schematic.

64. The method of claim 63 for use with a visual display and wherein the step of providing suggested changes includes providing suggested electrical schematic components to be removed from the electrical schematic via the interface.

65. The method of claim 64 wherein the step of providing via the interface includes displaying segments of the electrical schematics including the components to be removed where the components to be removed are shown in a distinguishing manner.

66. The method of claim 63 for use with a visual display and wherein the step of providing suggested changes includes providing suggested electrical schematic components to be added to the electrical schematic via the interface.

67. The method of claim 66 wherein the step of providing via the interface includes displaying segments of the electrical schematics including the components to be added where the components to be added are shown in a distinguishing manner.

68. The method of claim 63 for use with a visual display and wherein the step of providing suggested changes includes displaying via the interface segments of the electrical schematics including suggested changes to the electrical schematics where electrical components to be removed from the schematics are indicated in a

5 first distinguishing manner, electrical components to be added to the schematics are indicated in a second distinguishing manner and electrical components that existed in the original electrical schematics but will be used in a different capacity in the augmented electrical schematics are illustrated in a third distinguishing manner.

69. The method of claim 68 further including the step of facilitating toggling between the mechanical and electrical schematics.

70. A method for use with pre-existing electronically stored electrical and mechanical schematics where the electrical schematic indicates a control system to be used to control mechanical components corresponding to the mechanical schematics, the method comprising the steps of:

- 5 a) providing a visual interface;
- b) displaying at least a segment of the mechanical schematics via the interface;
- c) when at least one mechanical component is selected on the mechanical schematics, identifying components on the electrical schematics associated with the selected mechanical component on the mechanical schematic; and
- 10 d) displaying at least the identified electrical components.

71. The method of claim 70 further including the step of providing a specification that associates electrical components with mechanical components controllable by the electrical components and wherein the step of identifying components on the electrical schematics includes using the specification to

- 5 associate mechanical schematic components with electrical schematic components.

72. The method of claim 71 wherein the step of associating is performed prior to step (b).

73. The method of claim 71 wherein the step of associating is performed after the at least one mechanical component is selected.

74. The method of claim 71 wherein the specification includes a set of templates where each template includes a mechanical template icon sub-set and an associated electrical template icon sub-set where the electrical icon sub-set includes icons corresponding to electrical components for controlling mechanical components
- 5 corresponding to the mechanical template icon sub-set.

75. A method for identifying sections of an existing schematic that are consistent with best design practices, the method comprising the steps of:
- providing a template set, each template specifying a sub-set of components and relationships that are consistent with best design practices; and
 - 5 examining the existing schematic to identify sections of the existing schematic that are inconsistent with the best design practices specified in the template set.

76. The method of claim 75 wherein the section that is inconsistent with the best design practices is an inconsistent section, the method further including the step of, when a section of the existing schematic is inconsistent with the best design practices specified in the template set, performing a function on the existing
5 schematic.

77. The method of claim 76 wherein the function includes visually displaying the inconsistent section in a distinguishing manner.

78. The method of claim 76 wherein the function includes identifying a template that indicates a possible replacement for the inconsistent section and providing at least a section of the identified template.

79. The method of claim 75 wherein the existing schematic is an electrical schematic and wherein the step of providing a template set includes providing templates that specify both electrical icons corresponding to electrical components and relationships between the electrical icons.